

Application No. 10/700,136
Amendment filed with RCE

Customer No. 01933

R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

RE: THE ALLOWABLE SUBJECT MATTER

The Examiner's allowance of claim 36 and the Examiner's indication of the allowability of the subject matter of claim 3 is respectfully acknowledged.

Independent claim 37 has been amended to incorporate subject matter corresponding to the allowable subject matter of claim 3, as well as to correct a minor typographical error.

In addition, new claim 38 has been added depending from claim 36 to recite that the insulating film is formed of a single layer, along the lines recited in claim 1.

Still further, new claims 39-51 have been added to recite the subject matter of claims 4-16, respectively, depending from claim 36.

No new matter has been added, and no new issues with respect to patentability have been raised.

Accordingly, it is respectfully submitted that amended independent claim 37, and new claims 38-51 depending from allowed claim 36, are all in condition for immediate allowance along with allowed claim 36.

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RE: AMENDED CLAIM 1 and NEW CLAIMS 52-53

Claim 1 has been amended to clarify the feature of the present invention whereby each recess in the insulating film includes a first portion through which one of the holes extends and which surrounds a periphery of the one of the holes and a second portion which extends outwardly from the first portion. See Fig. 1.

In addition, claim 1 has been amended to clarify the features of the present invention whereby the at least one interconnection formed on the bottom surface of a corresponding at least one recess extends along the bottom surface, over the first portion and the second portion of the recess, whereby the at least one interconnection is directly contacted to a corresponding one of the connecting pads through a corresponding one of the holes in the insulating film, and whereby the at least one interconnection is formed of a same material along an entire length thereof. See Fig. 1 and the disclosure in the specification at, for example, page 9, line 24 to page 10, line 18.

Still further, new independent claim 52 has been added to recite the subject matter of claim 37 (before the present Amendment) revised along the lines of amended claim 1.

And finally, new claim 53 (depending from amended claim 1) has been added to recite the feature of the present invention

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whereby the at least one interconnection comprises a lower layer and an upper layer formed on an entire upper surface of the lower layer so as not to laterally extend from the upper surface of the lower layer, as supported by the disclosure in the specification at, for example, page 10, lines 5-18.

No new matter has been added, and it is respectfully requested that the amendments to claim 1 and the addition of new claims 52 and 53 be approved and entered.

CLAIM FEE

The application has previously contained as many as 3 independent claims and as many as 35 total claims, and the appropriate claim fee was paid for such claims. The application now contains 33 claims, of which 4 are independent. Accordingly, a claim fee in the amount of \$200 for the addition of 1 extra independent claim is attached hereto. In addition, authorization is hereby given to charge any additional fees which may be determined to be required to Account No. 06-1378.

RE: THE PRIOR ART REJECTION

Claims 1, 4, 12-16 and 37 were rejected under 35 USC 102 or under 35 USC 103 as being anticipated by or obvious in view of US 2002/0027298 (previously cited "Sakamoto et al"). These

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rejections, however, are respectfully traversed with respect to the claims as amended hereinabove.

According to the present invention as recited in amended claim 1, a semiconductor device is provided which comprises a semiconductor substrate having a plurality of connecting pads on one surface, an insulating film which is formed of a single layer and covers said one surface of the semiconductor substrate, and at least one interconnection. As recited in amended claim 1, the insulating film includes: (i) a plurality of holes extending through the insulating film, each of the holes corresponding to one of the connecting pads, and (ii) at least one recess extending partially through the insulating film such that a bottom surface of the recess is depressed with respect to an upper surface of the insulating film in a direction of thickness of the insulating film, wherein each recess includes a first portion through which one of the holes extends and which surrounds a periphery of the one of the holes and a second portion which extends outwardly from the first portion. And as recited in amended claim 1, at least one interconnection is formed on the bottom surface of a corresponding at least one recess to extend along the bottom surface, over the first portion and the second portion of the recess; each interconnection is directly contacted to a corresponding one of the connecting pads through a corresponding one of the holes in the insulating film;

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and each interconnection is formed of a same material along an entire length thereof.

In addition, according to new independent claim 52, a semiconductor device is provided which comprises a semiconductor substrate having a plurality of connecting pads on one surface, a protective film formed of a single layer, and a plurality of interconnections. As recited in new independent claim 52, the protective film includes: (i) a plurality of holes extending completely through the protective film, each of the holes corresponding to one of the connecting pads, and (ii) a plurality of recesses extending partially through the protective film, wherein each of the recesses has a recessed surface that is lower than an upper surface of the protective film in a thickness direction of the protective film, and each of the recesses includes a first portion through which one of the holes extends and which surrounds a periphery of the one of the holes and a second portion which extends outwardly from the first portion. And as recited in new independent claim 52, the plurality of interconnections are respectively directly connected to the connecting pads through the holes in the protective film, and are provided on the recessed surfaces of the protective film to extend along the recessed surfaces over the first and second portions of the recessed surfaces, and each of the

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interconnections is formed of a same material along an entire length thereof.

Thus, according to the structure of the present invention as recited in each of amended claim 1 and new independent claim 52, each recess in the insulating or protective film has a first portion in which a hole (corresponding to a connecting pad) is formed and which surrounds the hole, and a second portion that extends outwardly from the first portion. In addition, as recited in each of amended claim 1 and new independent claim 52, the interconnection formed in the recess extends across both the first and second portions and directly contacts the connecting pad. Still further, as recited in each of amended claim 1 and new independent claim 52, the interconnection is of from a same material over the entire length thereof.

By contrast, it is respectfully pointed out that even if the area between the isolation trenches 14 and around the areas for electrical connection means SD of Sakamoto et al were considered to be a recess as recited in amended claim 1 and new independent claim 52, these portions around the connection means SD in Sakamoto et al are shown only immediately around the periphery of the electrical connection means SD.

Accordingly, it is respectfully submitted that Sakamoto et al clearly does not disclose, teach or suggest a recess in a insulating or protective film that has a first portion in which a

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hole (corresponding to a connecting pad) is formed and which surrounds the hole, and a second portion that extends outwardly from the first portion. In addition, it is respectfully submitted that Sakamoto et al even more clearly does not disclose, teach or suggest an interconnection that extends along the bottom surface of the recess along both the first and second portions.

It is respectfully submitted, moreover, that if any portion of solder 23 of Sakamoto et al were considered to correspond to the interconnection(s) of the claimed present invention as suggested by the Examiner, it is clear that the solder 23 does not directly contact the electrical connection means SD, in the manner of the interconnection(s) of the present invention as recited in amended claim 1 and new independent claim 52.

Still further, it is respectfully pointed out that if any other portion of the structure disclosed in Sakamoto et al were considered to form the interconnection of the present invention in combination with the solder 23, then such interconnection of Sakamoto et al would not be formed of a same material along an entire length thereof, in the manner of the interconnection(s) of the present invention as recited in amended claim 1 and new independent claim 52.

In view of the foregoing, it is respectfully submitted that amended claim 1 and new independent claim 52, as well as each of

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claims 3-16 and 53 depending from claim 1, all clearly patentably distinguish over Sakamoto et al, taken singly or in any combination with any of the other prior art of record, under 35 USC 102 as well as under 35 USC 103.

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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned for prompt action.

Respectfully submitted,

/Douglas Holtz/

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